Designing a Web Application for Recognizing Past Learning Using the Laravel Framework

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ABSTRACT

This study aims to provide information on the application design process using the Laravel framework. This study aims to design a web application that can help higher education institutions manage students who take prior learning recognition (RPL) classes effectively and efficiently. The problem often faced by universities is the difficulty in recording the formal/non-formal education history of RPL students. This application is expected to provide a solution by providing features such as recording education history, training history, conference history, award history, organizational history, and employment history. The system development method used in the design is the System Development Life Cycle (SDLC) by utilizing the Laravel framework as a framework for the system development process. The expected results of this study are a web application that is user-friendly, reliable, and able to increase the efficiency of student data collection in universities.

Keyword: RPL; System Development Life Cycle; Laravel Framework.

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1. Introduction

Laravel Framework is a popular PHP framework, widely used in web application development due to its ease of use and complete features. In the context of education, this framework can be used to build complex information systems such as advanced learning recognition information systems (Niarman et al., 2023). The selection of this framework is based on research from (Ahmed et al., 2024; Amini et al., 2021; Garbarz & Plechawska-Wójcik, 2022; Hamzah et al., 2022; Laaziri et al., 2019; Mishra & Srivastava, 2021) Mentions that Laravel is a framework that is suitable for large-scale application development and is fast compared to other frameworks. In addition, this full-performance framework is one of the open-source frameworks and is easy to develop by novice developers. (Yadav et al., 2019).

Recognizing Past Learning (RPL) is a recognition of a person's learning achievements previously obtained either through formal, non-formal, informal education, or training related to their work or carried out autodidactically throughout their life. (Nizam, 2024). RPL provides an opportunity for individuals to gain recognition for their competencies, thereby increasing their chances of continuing their education to a higher level or getting a suitable job (Sierra, 2024). However, the process of managing data and information related to RPL is often still done manually, making it less efficient and prone to errors. Therefore, an information system is needed that can help educational institutions manage RPL data effectively and efficiently. RPL aims to collect data on prospective RPL students based on formal/non-formal education, making it easier for administrative staff to summarize the courses that can be taken by students.

This research focuses on the design and development of a prior learning recognition information system using the Laravel framework. This system is designed to provide convenience for educational institutions and students in managing advanced learning data, as

well as producing accurate and reliable reports. Thus, this system is expected to be an innovative solution in supporting the development of a competency-based education system.

2. Method

This section explains the methods and models used in the development of the proposed application. The proposed method is the Software Development Life Cycle (SDLC) method using the Waterfall model. The stages in the waterfall model are Requirement Analysis, Design, Development, Testing, and Maintenance. (Saravanos & Curinga, 2023).
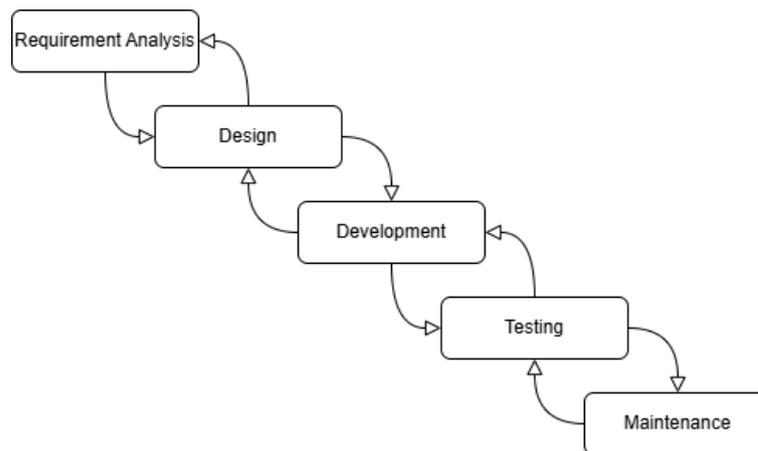
Figure 1. The Waterfall Model Proposed (Saravanos & Curinga, 2023)

a. Requirement Analysis

At this stage, the author uses Visual Studio code as a code editor with the extensions Laravel Artisan, Laravel Blade Snippets, Laravel Blade Spacer, and php IntelliSense. Furthermore, for the use of hardware, namely a MacBook Pro laptop with 16 GB RAM with the Sonoma 14.5 operating system. The data collection techniques used are conducting observations, interviews, and literature reviews.

b. Design

At this stage, the author compiles a system development guide by describing the flowchart of the Prior Learning Recognition Information System (RPL SI). Figure 2 illustrates a structured and easy-to-follow process flow for the prior learning recognition information system. This system allows users (students) to update and print their DRH, while the admin has access to all DRH data and can print the summary.
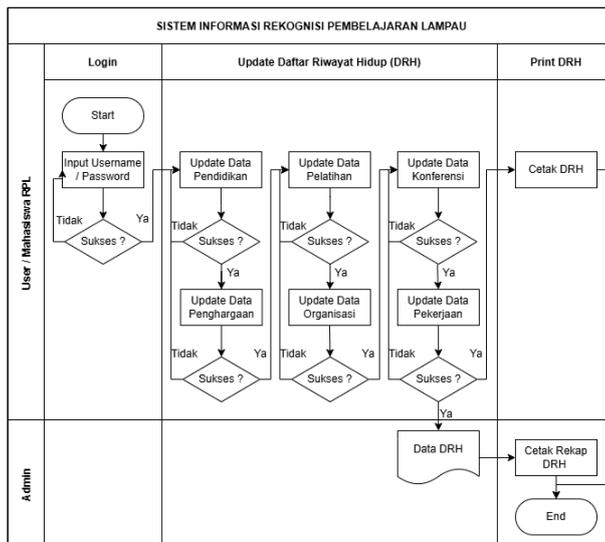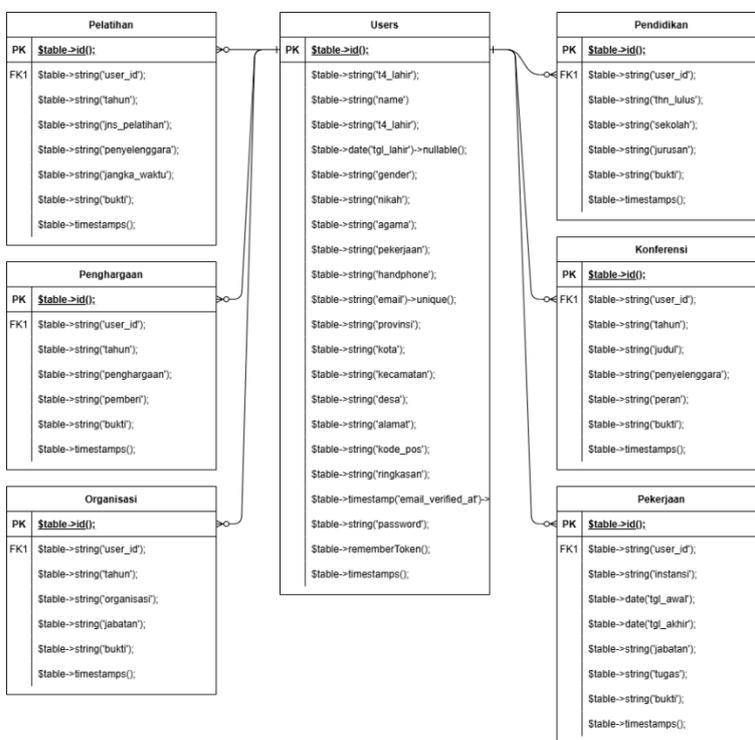
Figure 2. (a) Flowchart SI RPL

**Figure 3.** Entity Relationship Diagram of RPL

Figure 3 presents a structured database schema design for storing and managing information about a person's life history or experiences. This schema is well-designed and takes into account various aspects of the relevant data.

c. Development

At this stage, the actual coding or implementation process of the software is based on a previously determined design. The development of this application uses additional applications in the form of Git and GitHub. The purpose of this application is to perform version management and perform backup and recovery in the cloud. The following are the proposed models and tables for developing RPL applications.

Table 1. The Proposed Model and Tables

Database	Models	Tables
db_rpl	User	user
db_rpl	Award	penghargaan
db_rpl	Conference	konferensi
db_rpl	Education	pendidikan
db_rpl	Organization	organisasi
db_rpl	Training	pelatihan
db_rpl	Work	pekerjaan
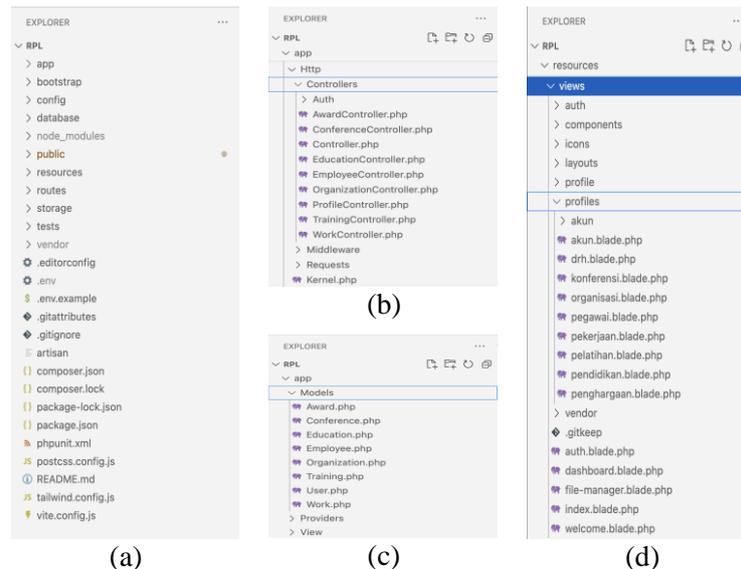
Figure 4. (a) Structure, (b) Controllers, (c) Models, and (d) Views

Models, Views, and Controller (MVC) is a software architecture that is popularly used in web development, including in the Laravel framework. (Verma, 2022). This concept divides the application into three main components that interact with each other. The structure of Laravel can be seen in Figure 4 (a). The configuration settings of the Laravel structure can be seen in the environment file. These configuration files allow you to configure things like your database connection information, your mail server information, as well as various other core configuration values such as your application timezone and encryption key (*Laravel - The PHP Framework For Web Artisans*, n.d.).

The model represents data to be stored and retrieved from the database. The model interacts directly with the database to store, retrieve, update, or delete data. In table 1, the writing of the model name is not the same as the table name. The table name can be adjusted. The structure of the proposed application model can be seen in Figure 4 (c).

The Views are responsible for presenting data to users attractively and interactively. Laravel uses the Blade template engine to create dynamic and maintainable views (*Laravel - The PHP Framework For Web Artisans*, n.d.). The structure of the views can be seen in Figure 4 (d).

The controller acts as an intermediary between the model and the view. The controller calls the model to retrieve or store data. The controller selects the appropriate view to display based on the results of data processing. The structure of the controller can be seen in Figure 4 (b).

d. Testing

The testing method used is black box testing with the equivalence partitions technique. Black box testing is a software quality test that focuses on software functionality. Equivalence partitions is a test based on data input on each form on each page of the RPL application.

Table 2. Test Case Design of Login Page

ID	Testing	Desired results
L01	Fill in the username and password and then click login	Successful login and get notification
L02	Fill in the username and password and then click login	Failed login and get notification
L03	Fill in the username and password and then click login	Required field
L04	Logout from the application	Successfully exit the system

Table 3. Test Case Design of DRH Page

ID	Testing	Desired results
D01	Opening the profile page menu	Successfully displaying the profile page
D02	Opening the education history page menu	Successfully displaying the education history page
D03	Opening the training history page menu	Successfully displaying the training history page
D04	Opening the education works page menu	Successfully displaying the works history page
D05	Opening the education conference page menu	Successfully displaying the conference history page
D06	Opening the awards history page menu	Successfully displaying the awards history page
D07	Opening the organization history page menu	Successfully displaying the organizations history page

Table 4. Test Case Design of CRUD (Create, Read, Update, Delete)

| ID	Testing	Desired results
C01	Create Data	Successfully and get notification
C02	Read Data	Successfully and get notification
C03	Update Data	Successfully and get notification
C04	Delete data	Successfully and get notification

e. Maintenance

The proposed system maintenance process is adjusted to the black box testing method. If there is a problem with the information not being appropriate, the application development history will be reopened on the git application.

3. Result and Discussion

Table 5 shows the results of the proposed application testing. The process of this testing is always carried out by the maintenance process if some features do not match the expected test case design. On ID L01, L02, L03, and L04 are tests of login and logout interactions from the application. ID D01, D02, D03, D04, D05, and D06 are tests for profile pages, education history, training history, job history, conference history, award history, and organizational history in sequence. ID C01, C02, C03, and C04 are tests for CRUD on each page of the application.

Table 5. The Test Results

ID	Result Obtained	Description
L01	Successful login and display notification	True
L02	Failed login and display notification	True
L03	Required field	True
L04	Successfully exit the system	True
D01	Successfully display the profile page	True
D02	Successfully display the education history page	True
D03	Successfully display the training history page	True
D04	Successfully display the work history page	True
D05	Successfully display the conference history page	True
D06	Successfully display the award history page	True
D07	Successfully display the organization history page	True
C01	Successfully add data and display notification	True
C02	Successfully edit data and display notification	True
C03	Successfully display data	True
C04	Successfully delete data and display notification	True
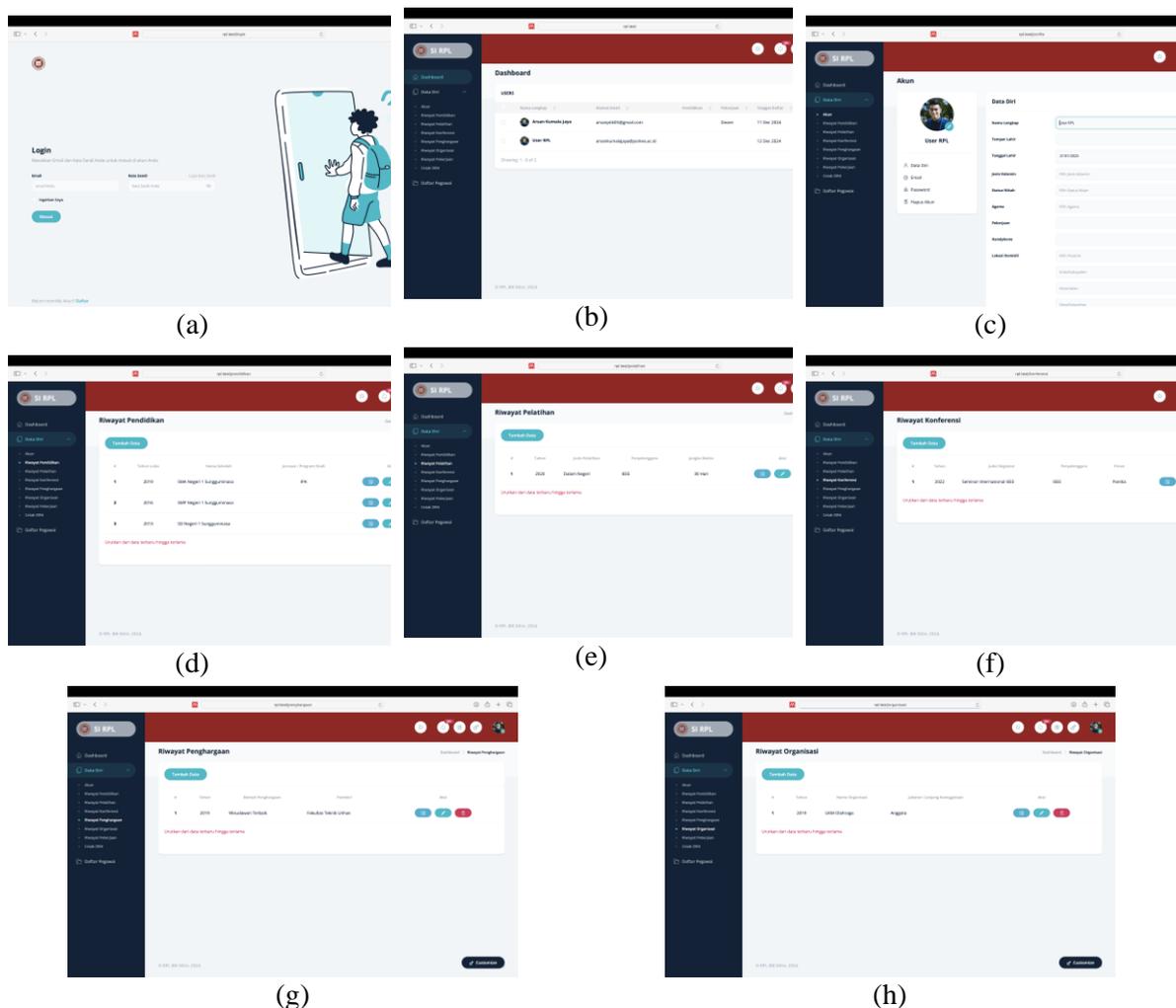
Figure 5. (a) Login Page, (b) Dashboard, (c) User Page, (d) Riwayat Pendidikan, (e) Riwayat Pelatihan, (f) Riwayat Konferensi, (g) Riwayat Penghargaan, (h) Riwayat Organisasi
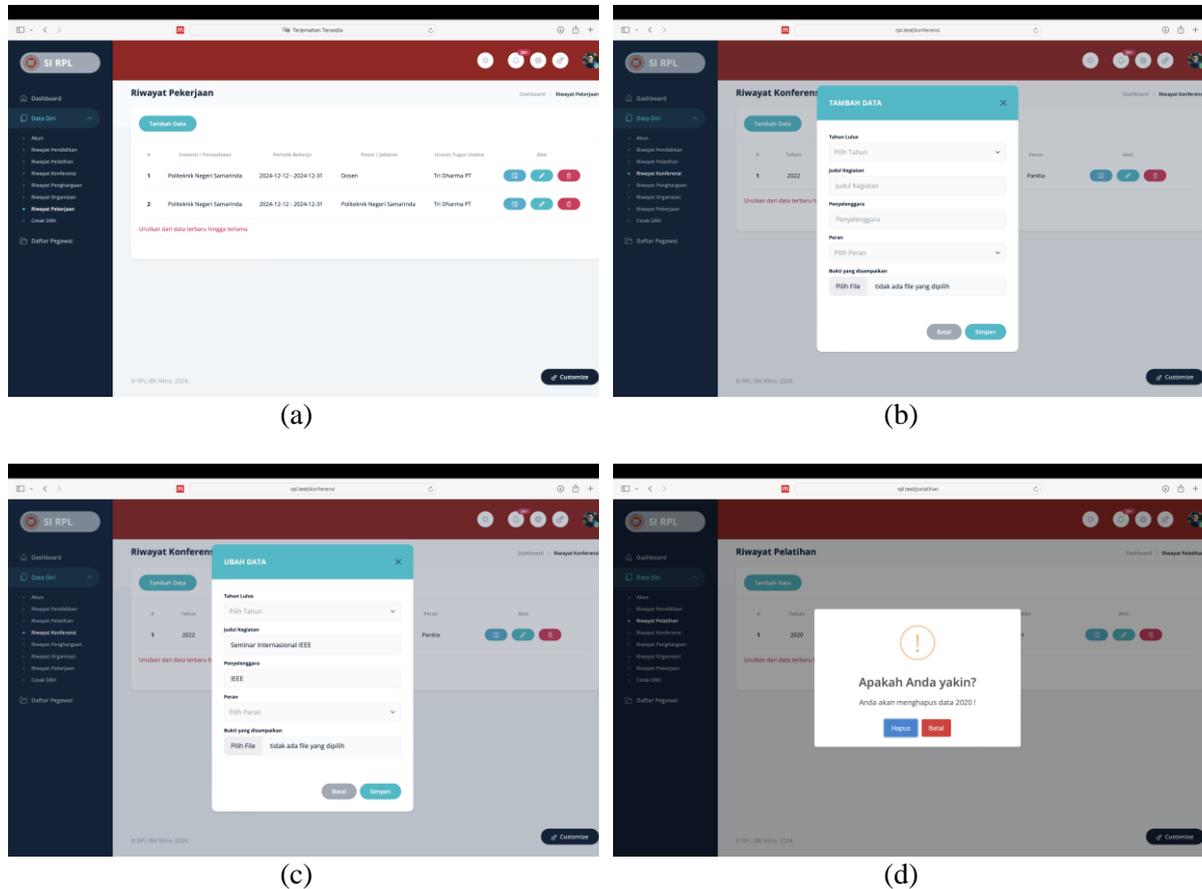
Figure 6. (a) Riwayat Pekerjaan, (b) Modal of Add Data,
(c) Modal of Edit Data, (d) Modal of Delete Data

4. Conclusion

This study focuses on designing an RPL web application using the Laravel framework. RPL is a process of recognizing learning that someone has acquired through experience, training, or non-formal education. This application aims to facilitate this process, especially in higher education.

Laravel is a popular PHP framework that provides various features and tools that facilitate the development of complex web applications. Model-View-Controller (MVC) is an architecture that separates application logic, views, and data management so that the code is more organized and easy to maintain. In addition, the Template Engine: Allows the creation of dynamic and easily managed views. application development using the waterfall model found in the SDLC method. The results of this application development use the equivalence partitions technique in the black box testing method to test the functionality of the RPL application.

This study successfully designed and developed an RPL web application using the Laravel framework and the Waterfall model. Testing with Black Box Testing and Equivalence

Partitioning showed that the application functioned well. This application is expected to help universities manage RPL student data effectively and efficiently.

The expected result of this research is a web application that is user-friendly, reliable, and able to improve the efficiency of student data collection in higher education. This application is expected to be an effective solution in managing RPL data so that it can support the implementation of the RPL program in Indonesia.

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